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10/521,544

01/14/2005

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EXAMINER

QUINTO, KEVIN V

ART UNIT

PAPER NUMBER

2826

MAIL DATE

DELIVERY MODE

05/29/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/521,544

Applicant(s)

SAKAI ET AL.

Examiner

Kevin Quinto

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 March 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 16 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-3 and 8-15 is/are allowed.
- 6) ☒ Claim(s) 4-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 March 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/15/07, 3/28/07</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 4-7 have been considered but are moot in view of the new ground(s) of rejection.

### *Election/Restrictions*

2. The previous Office action referred to "newly submitted claim 17" when it should have read *newly submitted claim 16*.
3. Newly submitted claim 16 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the search for claim 16 is not inclusive of a search for the claimed semiconductor device in claims 1-15 since the claimed method in claim 16 details the growth of a buffer layer and an additional superlattice layer on the substrate as well as a specific temperature range for the growth of the quantum well structure.
4. Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 16 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Drawings***

5. The drawings were received on March 15, 2007. These drawings are acceptable.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000) in view of Nettelblatt et al. (USPN 5,543,638).

8. In reference to claim 4, Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000, hereinafter referred to as the "Crawford" reference) discloses a structure which meets the claim. Figure 1 of Crawford discloses a gallium nitride (GaN)-based compound semiconductor device comprising: a GaN-based light emitting member which comprises a multilayer quantum well including an InGaN well layer and an AlInGaN barrier layer. Crawford does not disclose that the thickness of the InGaN well layer is 1 nm or greater and 2 nm or smaller. However Nettelblatt et al. (USPN 5,543,638, hereinafter referred to as the "Nettelblatt" reference) discloses that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10).

Art Unit: 2826

Thus Nettelblatt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 4 is not patentably distinguishable over the Crawford and Nettelblatt references.

9. With regard to claim 5, Crawford does not disclose that the thickness of the well layer is between 1.3 nm and 1.8 nm. However Nettelblatt (USPN 5,543,638) discloses that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10). Thus Nettelblatt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 5 is not patentably distinguishable over the Crawford and Nettelblatt references.

10. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000) in view of Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1).

11. In reference to claim 6, Crawford ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000) discloses a structure which

Art Unit: 2826

meets the claim. Figure 1 of Crawford discloses a gallium nitride (GaN)-based compound semiconductor device comprising: a GaN-based light emitting member which comprises a multilayer quantum well including an InGaN well layer and an AlInGaN barrier layer. Crawford does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1, hereinafter referred to as the "Makimoto" reference) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and indium in an AlInGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 6 is not patentably distinguishable over the Crawford and Makimoto references.

12. In reference to claim 7, Crawford does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Makimoto (United States Patent Application Publication No. US 2002/0195619 A1) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and

Art Unit: 2826

indium in an AlInGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 7 is not patentably distinguishable over the Crawford and Makimoto references.

### ***Allowable Subject Matter***

13. Claims 1-3 and 8-15 are allowed.

14. The following is a statement of reasons for the indication of allowable subject matter: the examiner is unaware of any prior art which suggests or renders obvious a gallium nitride based compound semiconductor device with a buffer layer adjacent to a gallium nitride based light emitting member which is comprised of a multilayer quantum well structure with an indium gallium nitride well layer and aluminum indium gallium nitride barrier layer.

### ***Conclusion***

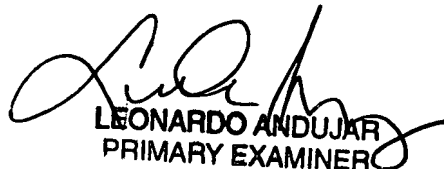
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

Art Unit: 2826

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KVQ

  
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PRIMARY EXAMINER

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